Anemia

KEY TEACHING POINTS

- Examination for pallor focuses on those parts of the body that present large numbers of superficial blood vessels with minimal natural skin pigments, such as the conjunctiva, tongue, oral mucosa, and palmar creases.
- The most compelling argument for anemia is conjunctival rim pallor.
- No single physical finding convincingly excludes the diagnosis of anemia.

I. INTRODUCTION

Anemia refers to an abnormally low number of circulating red cells, caused by blood loss, hemolysis, or underproduction of cells by the bone marrow. In patients with acute blood loss, the abnormal vital signs of hypovolemia are the most prominent physical findings (see Chapter 17), but in chronic anemia (the subject of this chapter), physical findings reflect instead changes in color of the skin and conjunctiva.

II. THE FINDINGS

Chronic anemia causes the skin and conjunctiva to appear abnormally pale because of reduced amounts of red-colored oxyhemoglobin that circulate in the dermal and subconjunctival capillaries and venules.[1] Nonetheless, pallor does not always indicate anemia, because skin color also depends on the diameter of these minute vessels, the amount of circulating deoxyhemoglobin, and the patient's natural skin pigments.[1] Vasoconstriction from cold exposure or sympathetic stimulation also may cause pallor, and the pallor of anemia may be obscured by the red color of vasodilation (inflammation or permanent vascular injury from ischemia, cold, or radiation), the blue color of cyanosis (see Chapter 9), or the brown pigments of dark-skinned persons. Theoretically, examination of the conjunctiva, nailbeds, and palms avoids the effects of the patient's natural skin pigments.

Most clinicians assess for pallor subjectively by comparing the patient's skin color with their own color or their recollection of normal skin color. One definition of pallor, however, is more objective: **conjunctival rim pallor** is present if examination of the inferior conjunctiva reveals the color of the anterior rim to have the same pale fleshy color of the deeper posterior aspect of the palpebral conjunctiva (Fig. 10.1).[2] In persons without anemia, the normal bright red color of the anterior rim contrasts markedly with the fleshy color of the posterior portion.
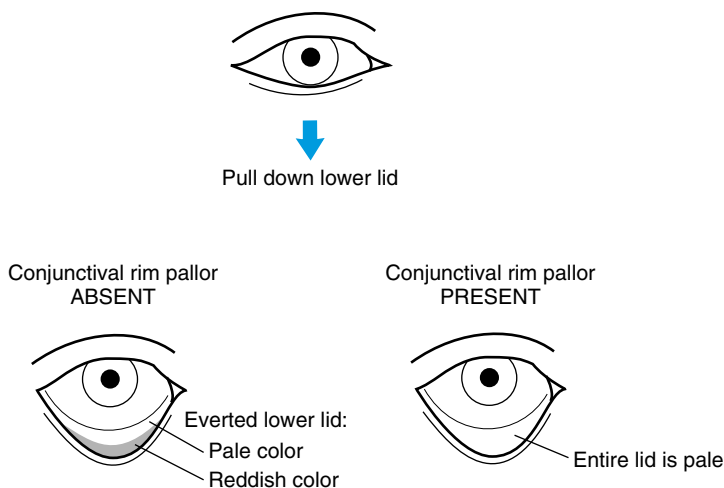
FIG. 10.1   CONJUNCTIVAL RIM PALLOR. After gently pulling down the patient's lower lid (*top*), the clinician observes the lid's inner surface, comparing the color of the lid margin (its *rim*) with the conjunctival surface nearer to the globe. In patients without anemia (*bottom left*), there are two zones of color: a reddish color at the rim (due to its prominent vascular supply) and a contrasting paler color nearer to the globe (from prominent lymphoid tissue). In patients with anemia (*bottom right*), the entire inner surface of the lower lid has a pale color (conjunctival rim pallor).

III. CLINICAL SIGNIFICANCE

EBM Box 10.1 presents the diagnostic accuracy of physical signs for chronic anemia as applied to hundreds of patients. These studies excluded patients with acute bleeding or those who had recently received transfusions. As much as possible, the color of skin and conjunctiva was determined using natural lighting.

According to EBM Box 10.1, the finding of conjunctival rim pallor (likelihood ratio [LR] = 16.7) increases the probability of anemia the most, followed by palmar crease pallor (LR = 7.9), palmar pallor (LR = 5.6), conjunctival pallor (i.e., not specifically conjunctival rim pallor, LR = 4.7), pallor at any site (LR = 3.8), facial pallor (light-skinned persons only, LR = 3.8), and tongue pallor (LR = 3.7). Nailbed pallor lacks diagnostic value (LR not significant). Importantly, no physical sign convincingly *decreases* the probability of anemia (i.e., no LR <0.4).

EBM BOX 10.1
Anemia*

Finding (Reference)[†]	Sensitivity (%)	Specificity (%)	Likelihood Ratio[‡] if Finding Is	
			Present	Absent
Pallor at any site[3-7]	22-77	66-92	**3.8**	0.5
Facial pallor[4]	46	88	**3.8**	0.6
Nailbed pallor[4,5]	59-60	66-93	NS	0.5
Palmar pallor[4,5]	58-64	74-96	**5.6**	0.4
Palmar crease pallor[4]	8	99	**7.9**	NS
Conjunctival pallor[4,5,8,9]	31-62	82-97	**4.7**	0.6
Tongue pallor[10]	48	87	**3.7**	0.6
Conjunctival Rim Pallor[2]				
Pallor present	10	99	**16.7**	—
Pallor borderline	36	—	2.3	—
Pallor absent	53	16	0.6	—

*Diagnostic standard: For *anemia,* hematocrit less than 35%,[4] hemoglobin (Hb) less than 10,[6] Hb less than 9 g/dL,[10] Hb less than 11 g/dL,[2,5,7-9] or Hb less than 11 g/dL in women and less than 13 g/dL in men.[3]

†Definition of findings: For *pallor at any site,* examination of skin, nailbeds, and conjunctiva;[3-5] for *facial pallor,* the study excluded black patients; for *palmar crease pallor,* examination after gentle extension of the patient's fingers; for *conjunctival rim pallor,* see Fig. 10.1.

‡Likelihood ratio (LR) if finding present = positive LR; LR if finding absent = negative LR.

NS, Not significant.

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ANEMIA
Probability
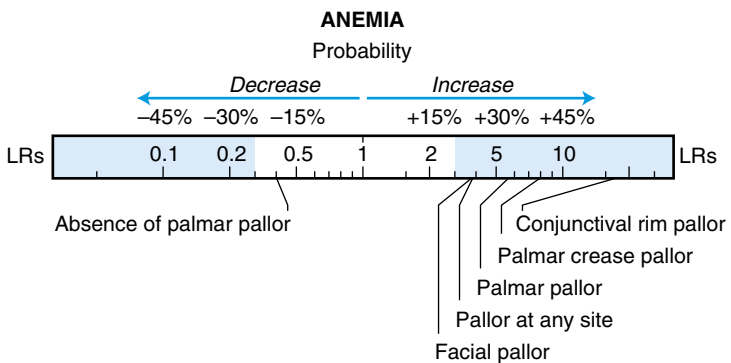
The references for this chapter can be found on *www.expertconsult.com.*

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